

QUEST

ADVENTURES IN THE WORLD OF SCIENCE



Q War at sea – ships, submarines, missiles



Q How were the oceans formed?

Q Killer shark – the real 'Jaws'

Q The world of air-sea rescue

Q Untamed power – the violence of the seas

Q Underwater explorers

Q Harvesting the oceans

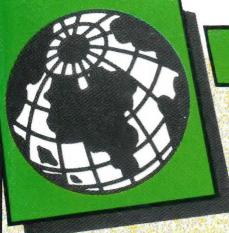
Q Patrol of the deep – bizarre sea creatures

THE OCEANS 1

QUEST

CONTENTS 1

PLANET EARTH



IN THE BEGINNING

Birth of the oceans – the continental shelf – volcanic islands – coral reefs – underwater mountains

1-2

THE VIOLENT SEAS

Wind fury and wave power – anatomy of a hurricane – killer waves – the Bermuda Triangle – waterspouts

3-4

THE LIVING WORLD



SHARK ATTACK

The great white – selecting its victim – worst mass attack – shark spotter – the man who survived

1-2

WONDERS OF THE DEEP

The female with the luminous head – the male who bears the babies – the fish filled with blue gas – and more

3-4



NEW TECHNOLOGY

WEAPONS AT SEA

Sea-skimming missiles – tracking Exocet – Seawolf – Nimitz and Invincible – Polaris and Trident

1-4

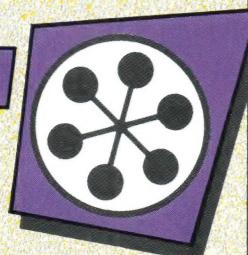
RESCUE AND SURVIVAL

The fastest lifeboats – Wessex and Sea King helicopters – Zeebrugge – tips for ocean survival

5-6

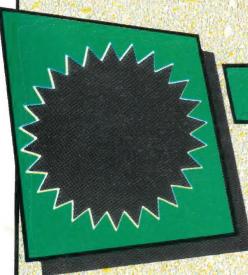
FUTURES

1-4



PROBING THE DEPTHS

The scuba diver – how the aqualung works – the 'narks' and the 'bends' – saturation and atmospheric diving – submersibles – robots – exploring the *Titanic* – the diver's 'astronaut' suit – underwater cities



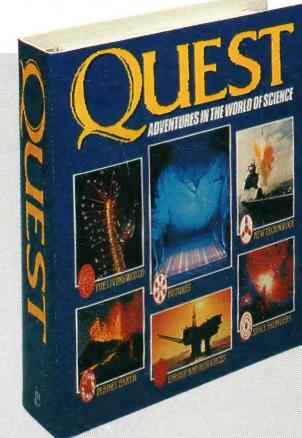
ENERGY AND RESOURCES

WEALTH OF THE OCEANS

Minerals under the sea – plundering the ocean's resources – farming for fish – deep sea drugs – pollution, the world's great dilemma – tuna and whale scandals – the sea's most valuable resource

1-4

Cover The British light aircraft carrier, HMS *Invincible*.
Richard Cooke



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ADVENTURES IN THE WORLD OF SCIENCE

Q Earth and the Milky Way

Q How a star is born



Q Survival in space

Q Spy in the sky

Q Shuttle service
to the stars

Q The outermost planets

Q Star Wars —
will it happen?

Q Telescopes for the future

Q Manned missions
to Mars

Q Moon-walk

MAN IN SPACE 2

QUEST

CONTENTS 2



PLANET EARTH

A PLACE IN THE UNIVERSE

Earth in the Solar System – the Milky Way – how the Earth was created – galaxies and the Universe – meteorite bombardments – death of the dinosaurs

5-6

THE LIVING WORLD

SURVIVING IN SPACE

Training astronauts – weightlessness – zero-gravity and its effect on the human skeleton – working in space

5-6



NEW TECHNOLOGY

FLYING THE SHUTTLE

The re-usable spacecraft – using manned manoeuvring units in space – Shuttle missions

7-8



STAR WARS

X-ray lasers – interceptor rockets – rail guns and particle guns – heat seeking sensors – killer satellites

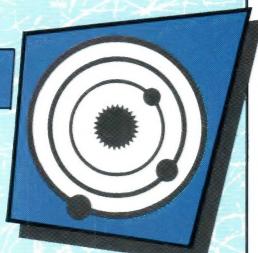
9-10

SPACE FRONTIERS

MOON SHOT

Man's first steps on the Moon – the Apollo spacecraft – exploring the Moon's surface – splashdown to Earth

1-2



THE OUTER PLANETS

Jupiter – Saturn – Uranus – Neptune – Pluto – multi-coloured atmospheres and gassy blankets – colliding worlds

3-4

MARS – MAN'S NEXT BASE

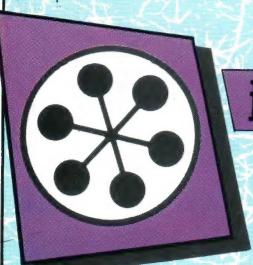
Space flights to the Red Planet – robot probes on Martian soil – the Mars Observer craft – future colonization

5-8

LIFE OF A STAR

The stellar giants – black holes and supernovas – death of the Sun

9-10



FUTURES

SPY IN THE SKY

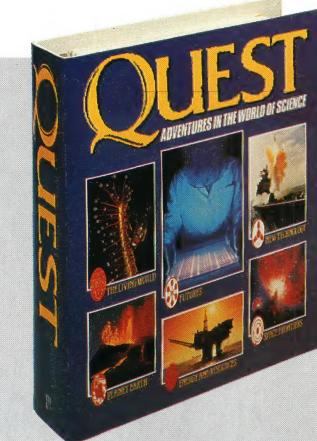
Mapping the Earth's resources – weather predictions – artificial 'stars'

5-6

TELESCOPES FOR TOMORROW

The all-seeing tools of astronomy – decoding cosmic messages – radio telescopes

7-8



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ADVENTURES IN THE WORLD OF SCIENCE

Q Disc versus tape – the audio visual revolution



Q The world of TV and radio

Q Telephones for the future

Q Modern mail – and facts about fax

Q How animals converse

Q Satellites – relaying messages through space

Q Inside print technology

Q Waiting for alien messages



COMMUNICATIONS 3

QUEST

CONTENTS 3

THE LIVING WORLD



ANIMAL CHAT

Secret signs and signals — dancing honeybees — teaching chimps to communicate — talking dolphins — the song of the humpback whale — soldier ants and pheromones

7-8

NEW TECHNOLOGY

INSIDE RADIO AND TELEVISION

Radio broadcasting — AM and FM — varying wavelengths — combining sound and vision — cable and satellite TV — giant-sized and miniature screens

11-14



THE PRINT BUSINESS

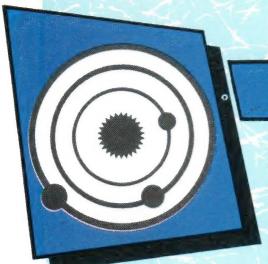
Reproducing colour — screening dots — how the printed word reaches the page — hot metal versus computer typesetting — printing by laser — desk-top publishing

15-16

AUDIO VISUAL

How records and tapes are made — video and the future of VHS — CD players — music by laser — the rise of digital audio tape — perfect sound

17-20



SPACE FRONTIERS

MESSAGES FROM THE SKY

Navigation from space — using transmission satellites — how messages are received — what are Molniya and Intelsat? — in-car satellite links

11-12

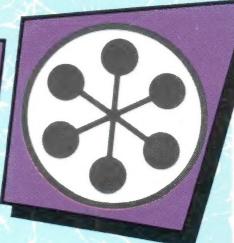
IN SEARCH OF E.T.

Waiting for alien messages — choosing the right frequency — the Arecibo pictogram — Pioneer and Voyager space probes — interpreting the language

13-14

FUTURES

9-10



ELECTRONIC MAIL

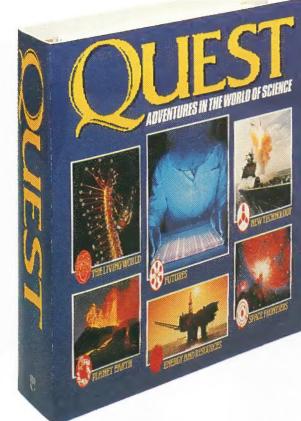
The automatic post office — sorting by dots — computer links — fax machines and telex — exchanging information — shopping by phone

11-14

THE TELEPHONE REVOLUTION

Cordless phones and translation systems — analogue and digital signals — radiophones and answering machines — optical fibre — videophones

Cover 'Communications: The State of the Art' Steven Hunt/
Image Bank Michael Jackson Rex Features



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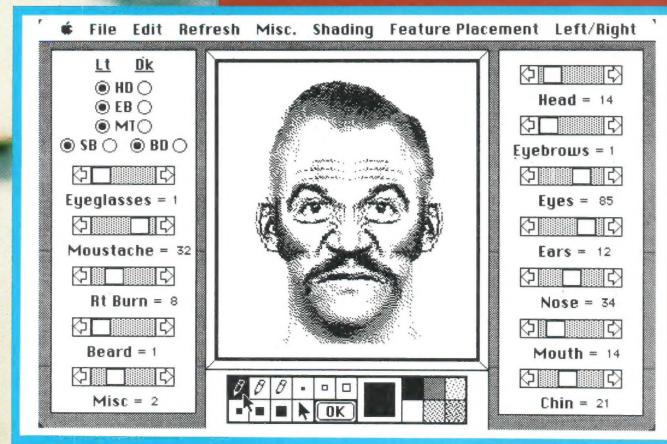
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ADVENTURES IN THE WORLD OF SCIENCE

FACT FILES ON:

Q Policing the violent 90s



Q New ways to identify the criminal

Q Guns – and the science of ballistics

Q Fraud and forgery

Q Drugs deterrents

Q Hijack and terrorism

Q Murder – the victims and assailants

Q Computer-age law enforcement



CRIME BUSTERS

4

QUEST

CONTENTS 4



PLANET EARTH

THE DRUGS MENACE

Major drugs producing areas – the big three (heroin, cocaine and marijuana) – how drugs are smuggled – catching the dealers

7-8

THE LIVING WORLD

MURDER ONE

Establishing the cause of death – role of the pathologist – estimating time of death – deadly poisons – post mortems – rogues gallery

9-12



HIJACK!

Profile of a hijack – saving the hostages – the Stockholm Syndrome – the Iranian Embassy siege – bargaining ploys – role of the SAS

13-14



NEW TECHNOLOGY

FRAUD AND FORGERY

Catching the counterfeiter – computer crime – forging the 'great masters' – carbon dating and the Turin shroud

21-22

COMPUTER-AGE POLICING

Using technology to stop crime – HOLMES and the Police National Computer – traffic monitoring – international policing

23-24

GUNS AND BALLISTICS

Inside a gun barrel – profile of a pistol – identifying the killer bullet – gun calibres – assorted criminals' weapons

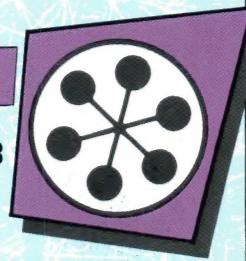
25-26

FUTURES

DANGER PATROL

Policing a riot – protective materials – tear gas – plastic bullets – controlling football crowds – defusing terrorist bombs

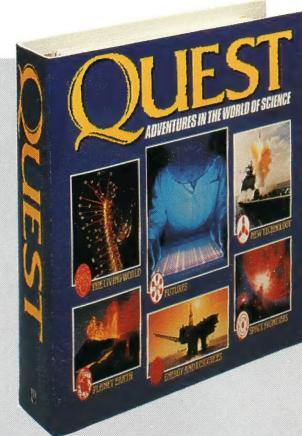
15-18



IDENTIFYING THE CRIMINAL

Photofits and videofits – fingerprints – dentistry and blood types – lie detectors – DNA – first genetic conviction

19-22



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OUT IN

ADVENTURES IN THE WORLD OF SCIENCE

- Q Homes for the future
- Q Animal society
- Q Urban transport
- Q Sewage systems – how they work

- Q Inner city pests

- Q Energy for all –



- Q Solving the population crisis



CITIES AND COMMUNITIES

QUEST

CONTENTS 5



PLANET EARTH

POPULATION OVERLOAD

Overcrowded capitals – the meteoric rise of Mexico City – the Chinese solution – feeding the Third World – shanty towns

9-10

THE LIVING WORLD

URBAN PARASITES

The common house fly – the bluebottle – cockroaches – killer rats – house mice – scavenger birds – disease carriers

15-16



ANIMAL KINGDOMS

Ant society – elephant herds – monkeys and apes – the amazing meerkats – packs of wolves – birds and fishes – family units

17-20



NEW TECHNOLOGY

GETTING ABOUT TOWN

Modern buses and trams – unmanned tube trains – the London Docklands railway – cable cars – the floating train – taxis for the future

27-30

THE WASTE CYCLE

Underground sewage – making waste safe – average water consumption – anatomy of a sewage plant – creative use of effluents

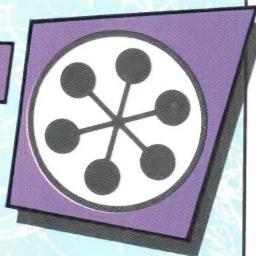
31-32

FUTURES

BUILDINGS FOR THE FUTURE

Polluted cities – planning a new town – unusual houses – underground homes – geodesic domes – the solar house – 'grow your own home'

23-26

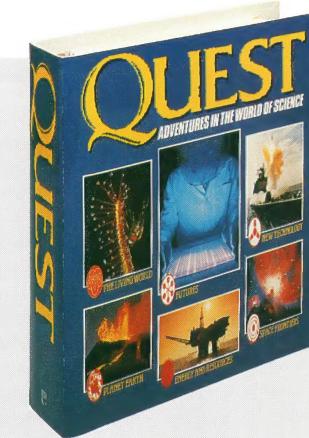


ENERGY AND RESOURCES

POWER TO THE PEOPLE

Gas rigs – 'the intelligent pig' – how electricity is generated – nuclear power – the Chernobyl disaster – alternative energy sources

5-8



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ADVENTURES IN THE WORLD OF SCIENCE



- Is Man his own worst enemy?
- Lifeforms billions of years ago
- Cells – building blocks of life
- Man learns to walk and talk
- Test-tube babies and cloned animals
- Everyday life in a space station
- Beyond the human being

LIFE FORCES 6

QUEST

CONTENTS 6



PLANET EARTH

FOUR BILLION YEARS BC 11-12

Organic molecules in the Earth's gases – chemical reactions triggered by Nature – single-cell life – cell divisions and mutations

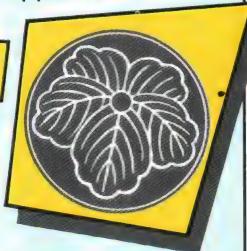
SMALL BEGINNINGS 13-14

The first fossils – jawless fish – life on land begins – resilient cockroaches – death of the dinosaurs – Man appears

THE LIVING WORLD

THE EVOLUTION OF MAN 21-24

The oldest footprints – Man stands up – making tools and hunting for food – early settlers – population explosion



NEW TECHNOLOGY

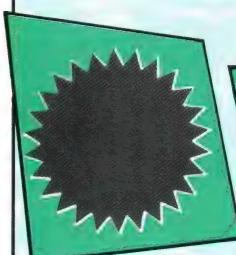
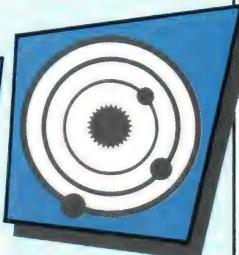
CLONE ZONES 33-36

Genetic engineering – cloning plants – playing God – frozen for the future – replacement surgery – Frankenstein monsters

SPACE FRONTIERS

A HOME IN SPACE? 15-16

Without gravitation – artificial day and night – space foods – recycling waste – radiation hazards – space colonies



ENERGY AND RESOURCES

THREAT TO LIFE 9-12

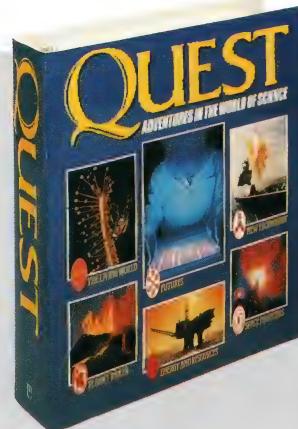
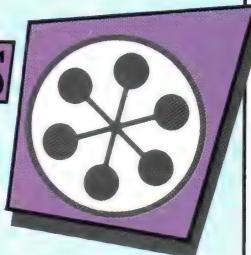
Endangered species – the end of the rain forests – burgers instead of trees – creating deserts – the greenhouse effect – acid rain

FUTURES

THE MAN MACHINE 27-30

Cars made by robots – machine scientists – sperm and cell banks – living in a box – bionic man – bio-chips

Cover Robot car welders



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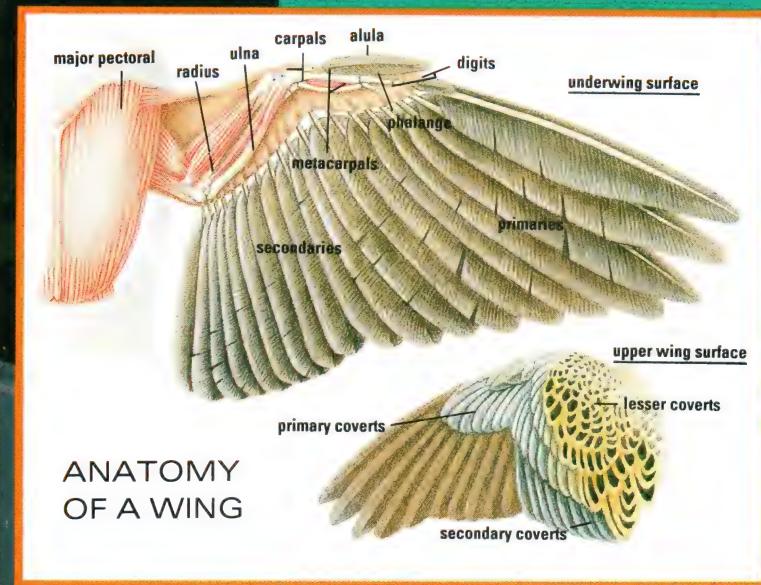
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- Testing planes - from wind tunnel to simulator
- Computer controlled cockpits
- Into the future - invisible aircraft
- Sky wars
- The vertical flyers
- Floating and gliding
- Why planes fly



- Nature's flying machines

FLIGHT 7

QUEST

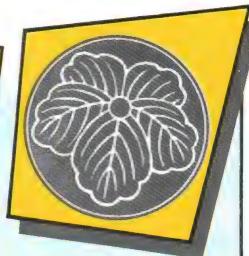
CONTENTS 7

THE LIVING WORLD

NATURE'S FLYING MACHINES

How birds fly – wing shapes – flying insects – globetrotting butterfly – bird navigation – seeing with the ears – bats and homing pigeons

25-28



NEW TECHNOLOGY

SKY WARS

Fighters into bombers – cranked-arrow wings – dual-role fighters – short take-off and landing – missile systems – Exocets – falling from the sky

37-38



FLIGHT 2000

Flight-data helmets – voice control – thought control – ejector seats – invisible planes – lighter materials – Stealth aircraft

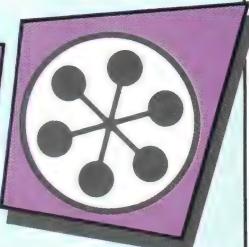
39-42

FUTURES

FLYING COMPUTERS

Fly-by-wire – alpha-floor protection – optical control systems – the black box – fault display systems

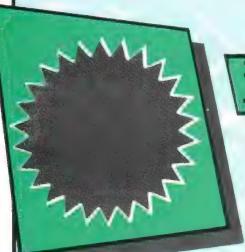
31-32



TEST PILOT

Out of the wind tunnel – engineering simulators – heat-sensitive paints – weather watch

33-34



ENERGY AND RESOURCES

WHAT GOES UP

The principles of flight – air speed – how to reduce drag – 'pitch, roll and yaw' – jets versus propellers – the world's busiest airport

13-14

LIGHTER THAN AIR

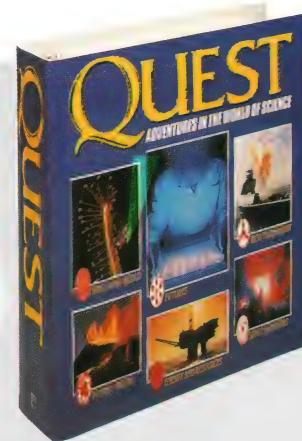
Hot-air balloons – Hindenburg disaster – steering airships – gliders and hang gliders – balloons in use

15-18

ROTOR FORCE

Vertical take-off – giant choppers – aerial hovercraft – controlling a helicopter – tilt-rotors – military uses

19-20



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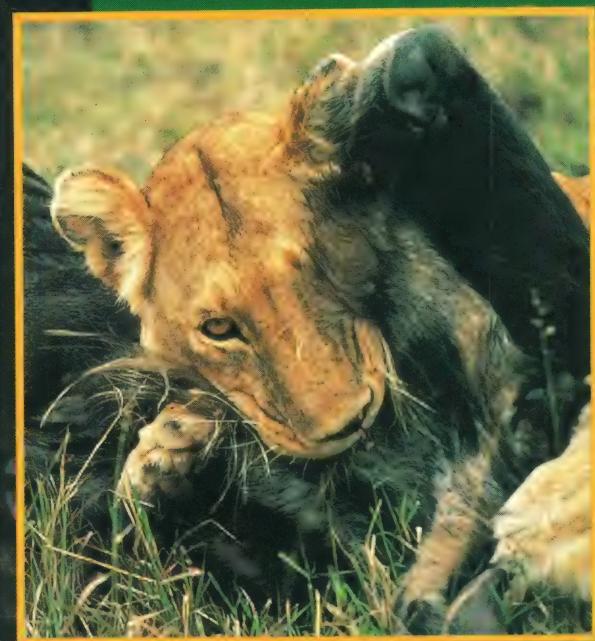
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QUEST

ADVENTURES IN THE WORLD OF SCIENCE

Q Animal attack and self-defence



Q Satellite killers

Q Uranium, plutonium and chain-reactions

Q The Nuclear Bomb

Q What happens if the bomb falls...

Q Chemical warfare

Q Crossbow hunters

Q Anti-tank weapons



WEAPONS 8

QUEST

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THE LIVING WORLD

THE PREDATORS

29-32

Killing to survive – the big cats – danger in the water – stings and shocks – deadly reptiles – death by suffocation – fangs and poison

NEW TECHNOLOGY

BOW HUNTER

43-44

High-tech archery – the revolutionary compound – modern arrows – today's technology and the crossbow – the crossbow pistol

45-48



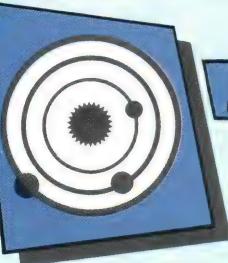
COUNTER ATTACK

Anti-tank missiles – tank armaments – armour-piercing shells – air attacks – methods of subterfuge – stealth technology – complex ECM systems

49-52

THE NUCLEAR AGE

Multiple warheads – measuring in megatons – nuclear explosions – theatre nukes – tactical weapons – neutron bombs – long range attacks



SPACE FRONTIERS

SATELLITE KILLERS

17-18

ASAT systems – exploding interceptors – air launched missiles – particle beam weapons – orbiting space mines – laser beam attack

FUTURES

CHEMICAL WARFARE

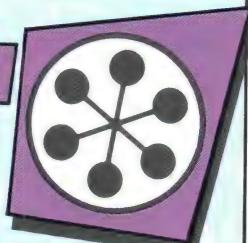
35-36

The poor man's deterrent – nerve gases – binary gases – biological weapons

IF THE BOMB FALLS ...

37-38

The fatal effects of fallout – a changing world climate – the dangers of starvation – the end of civilization



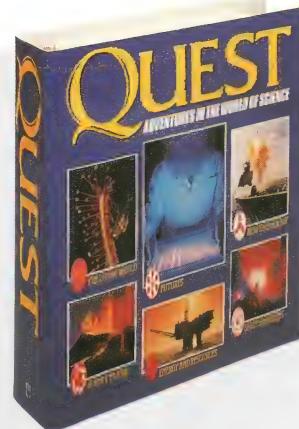
ENERGY AND RESOURCES

CHAIN REACTION

21-22

Neutrons, protons and electrons – uranium 235 – splitting the atom – uranium enrichment plants – plutonium production – the ultimate test

Cover International ballistic missile. USAF/TRH



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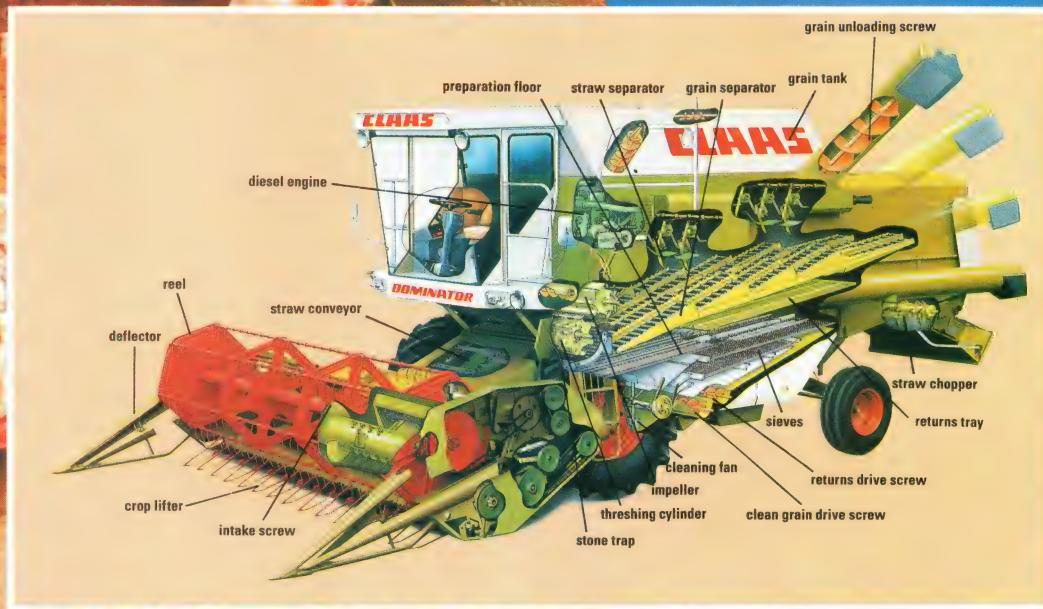
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ADVENTURES IN THE WORLD OF SCIENCE

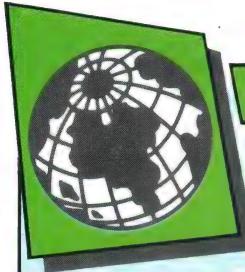
- Vital nutrients
- Food irradiation
- Animal's strange eating habits
- Battery farming
- Disease-resistant crops
- Additives and antibiotics
- Bar codes de-coded
- Food preservation
- Automation and the computerized cow



FOOD AND NUTRITION 9

QUEST

CONTENTS 9



PLANET EARTH

TRAINED TO SURVIVE

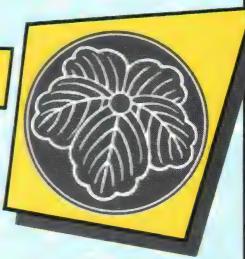
15-18

Soldier's survival pack — effects of dehydration — catching game in the wild — earth ovens — survival at sea

THE LIVING WORLD

WEIRD DIETS

33-34



Animals' strange eating habits — immunity to poison — vegetarian vultures — insects that eat their mate — regurgitating food — worm casts



NEW TECHNOLOGY

INTENSIVE FARMING

53-56

Battery hens — meat production — boosting growth — automated milking — fish farms — biological controls

PROCESSES FOR PRESERVATION

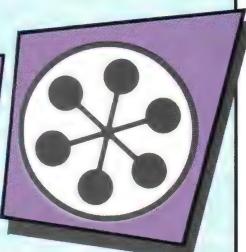
57-58

Yeast and moulds — bacteria — food spoilage — heat treatments — drying techniques — blast and plate freezing — food irradiation — megarads

FUTURES

SCI-FI FOODS

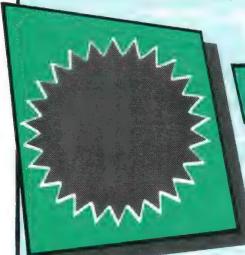
39-40



SUPERMARKET 2000

41-42

Bar codes — micro-computers and flat-bed scanners — changing price lines — up-dating stock records — cheque machines — shopping with cards



ENERGY AND RESOURCES

FUEL FOR LIFE

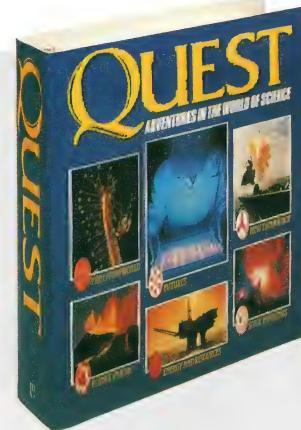
23-26

The importance of protein — different fats — sugary and starchy carbohydrates — vital vitamins

TIPPING THE BALANCE

27-28

Two sides of the coin — food mountains and famine — food adulteration — a mouthful of additives — bloating poultry with water — antibiotics in meat



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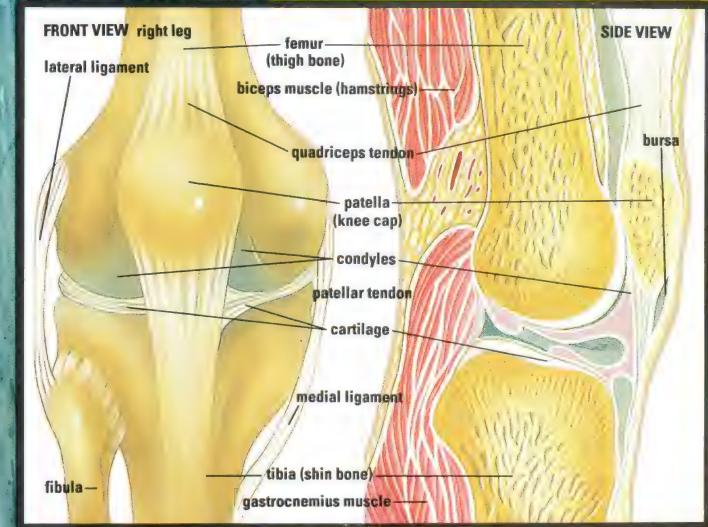
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ADVENTURES IN THE WORLD OF SCIENCE



- High altitude hazards
- Breeding champion animals
- Revving up racing cars
- Analyzing performance
- Muscle power
- Anatomy of a ski
- Surfing skills
- Eating to win



- Injuries – causes and cures

SCIENCE OF SPORT

10

QUEST

CONTENTS 10



PLANET EARTH

MAN AGAINST NATURE

Conquering mountains – oxygen at high altitudes – physical adaptation – slalom and downhill skiing – how a ski is made – danger of avalanche – potholing – latest equipment

19–22

CONQUERING THE WAVES

Wave power – body surfing – styles of board – aerodynamics of windsurfing – water skiing – dynamic balance – shooting the rapids – rowing – lever and fulcrum

23–26

THE LIVING WORLD

BREEDING THOROUGHBREDS

Breeding for success – new bloodlines – in-breeding – pedigrees – stud farms – champion greyhounds – hot-shot pigeons – planned pairings

35–36



SPORTING HAZARDS

Overtraining and injury – muscle tears and strains – anatomy of a knee – stress fractures – avoiding damage – warming up – laser therapy

37–38



NEW TECHNOLOGY

HIGH PERFORMANCE EQUIPMENT

Multi-gym – weight chains and cams – Hydraulic machines – computer analysis – artificial playing surfaces – photo finish cameras – footwear

59–60

POWER RACING

Maximizing engine power – electronic turbochargers – super-lightweight chassis – braking systems – carbon fibre discs – four-wheel drive – stepless gear boxes

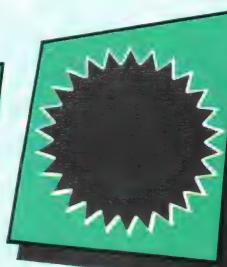
61–64

ENERGY AND RESOURCES

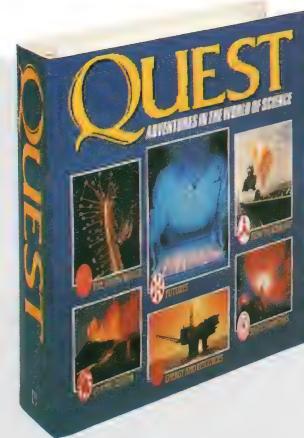
THE TRAINED BODY

Strength training – increasing endurance – reaction times – stretch receptors – balance and co-ordination – momentum and force – energy reserves – carbohydrate loading

29–32



Pack cover: monoskiing; 3D computer breakdown of a gymnast's movements; **Fact file cover:** anatomy of the right knee; climbing the sheer face of Manic Strain



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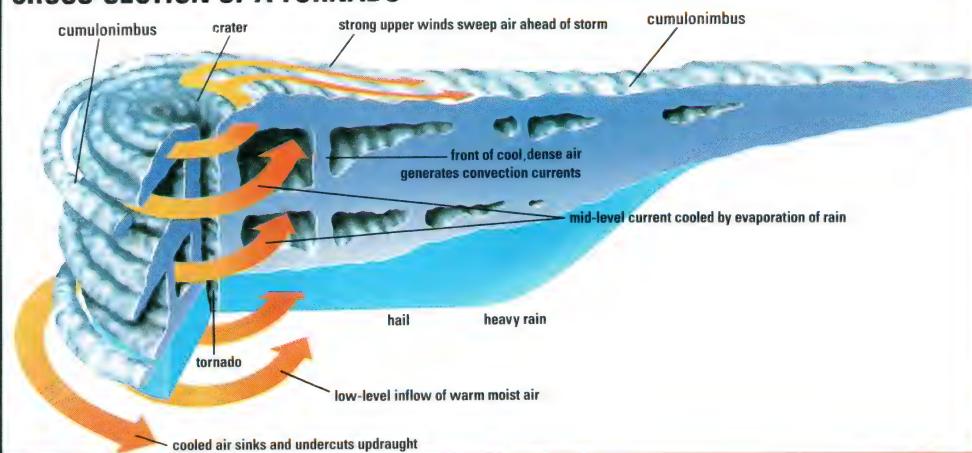
QUEST

ADVENTURES IN THE WORLD OF SCIENCE



- The troposphere
- Major wind belts
- Depressions and anticyclones
- Cloud types
- Manipulating weather
- Weather satellites
- Synthesizing weather data
- Photovoltaic cells
- Violent storms

CROSS-SECTION OF A TORNADO



WEATHER

11

QUEST

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UNDERSTANDING WEATHER 31-32

Solar radiation – the troposphere – tropical heat – effect of the Earth's rotation – trade winds

NATURE'S FORCES 27-30

Tropical storms – hurricane winds – tornadoes – dust devils – white-outs – electric storms

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Weather systems – movement of air masses – depressions – anticyclones – classifying clouds – dew point

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HIGHS AND LOWS 39-40

Summertime crime – SAD syndrome – hormone levels – positive effects of negative ions – why sun is fun



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COPING WITH THE COLD 65-66

Snow busters – salting the roads – monitoring systems – insulated clothing – waterproof fabrics – space blankets – hypothermia

FORECASTING 67-70

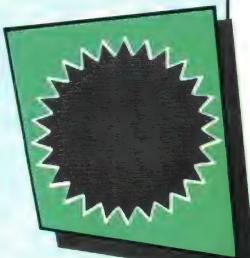
Data collection – tracking balloons – satellite transmissions – radar networks – automatic buoys – electromagnetic radiation



ENERGY AND RESOURCES

NATURAL POWER 33-34

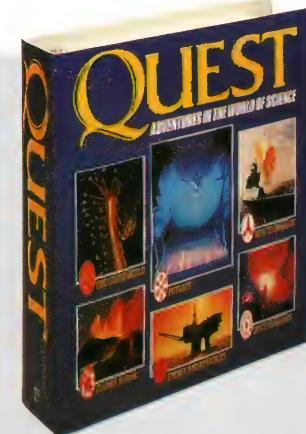
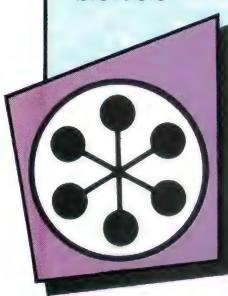
Wind-powered ships – solar panels – the photovoltaic cell – modern windmills – cruising on jet streams – biofuels



FUTURES

MANIPULATING WEATHER 43-44

Inducing rainfall – consequences of pollution – the 'greenhouse effect' – UV rays – depleted ozone levels



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ADVENTURES IN THE WORLD OF SCIENCE

Q Autoguide systems for cars

- Q Aerodynamic 'artics'
- Q Monster supertankers
- Q Motorways in the sky
- Q Harnessing animal power
- Q Fuels from animal waste
- Q Bicycle styles
- Q The container revolution

TRANSPORT 12.



QUEST

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CARGO CARRIERS

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The container revolution – ultra-large crude carriers – ro-ro ships – pitch propellers – sinking ships

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Draught and pack animals – horse power – harnessing oxen – two types of camel – domesticated elephants



NEW TECHNOLOGY

SKY LINERS

71-74

Motorways in the sky – aircraft 'stacks' – instrument landing systems – baggage handling – security – electric scanners – hypersonic aircraft

HIGH-TECH ARTICS

75-76

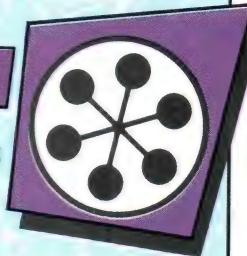
A home from home – self-adjusting disc brakes – lightweight cabs – rubber suspensions – computerized gearboxes – electronic brakes

FUTURES

SPEEDING AHEAD

45-48

Tomorrow's car – autoguide system – fuel injection system – super railways – high-speed trains



ENERGY AND RESOURCES

FUELS OF THE FUTURE

35-36

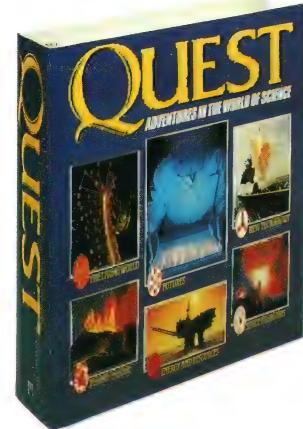
Oil refineries – methane from manure – cheaper, cleaner fuels – unleaded petrol – lean burn engines – dangers of carbon monoxide

PEDAL POWER

37-40

Human horsepower – aerodynamic frames – moulded plastic wheels – derailleur gears – carbon fibre wheel rims

Pack cover: supersonic Sanger plane (MBB-ERNO); time trialling bike (Photosport International), the Channel Tunnel (Channel Tunnel Group Ltd). **Fact file cover:** Ford's prototype car (Ford); visual control room at Heathrow Airport, London



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ADVENTURES IN THE WORLD OF SCIENCE

Steel Arch Bridge

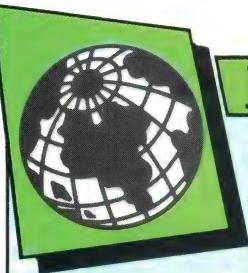


- Q Space structures
- Q Blasting through rock
- Q Artificial islands
- Q Pile drivers and mega cranes
- Q Are skyscrapers safe?
- Q Webs and nests
- Q Suspension bridges
- Q Cement plants and concrete makers

CONSTRUCTIONS 13

QUEST

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41-42

Types of dam – water pressure – dam disasters – importance of sluices – harbour walls – barrages and locks – strengthening cliffs

BRIDGES AND TUNNELS

43-46

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SEA STRUCTURES

47-48

Offshore platforms – huge floating structures – giant crane barges – buoyancy tanks

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NATURE'S ARCHITECTS

43-44

Ingenious structures – controlled environments – air conditioning – natural materials – sewing and weaving – chimney spires



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SKYSCRAPERS

77-80

Gravity and wind pressure – support structures – controlling sway – safety factors – fighting fire – automatic sprinkler systems

MEGA MACHINES

81-82

Pile drivers – giant drills – high-power pumps – telescopic cranes – pumping concrete

SPACE FRONTIERS

ASTROSTRUCTURES

19-20

Advantages of weightlessness – modules for space stations – using robots – welding in space

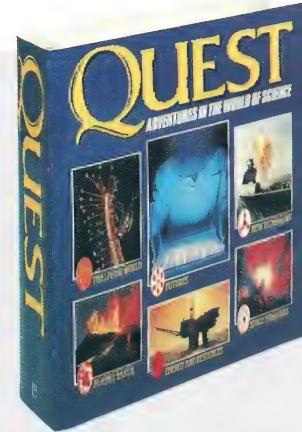


ENERGY AND RESOURCES

TODAY'S MATERIALS

41-44

Versatile cement – shaping structural steel – lightweight building blocks – stress grading timber



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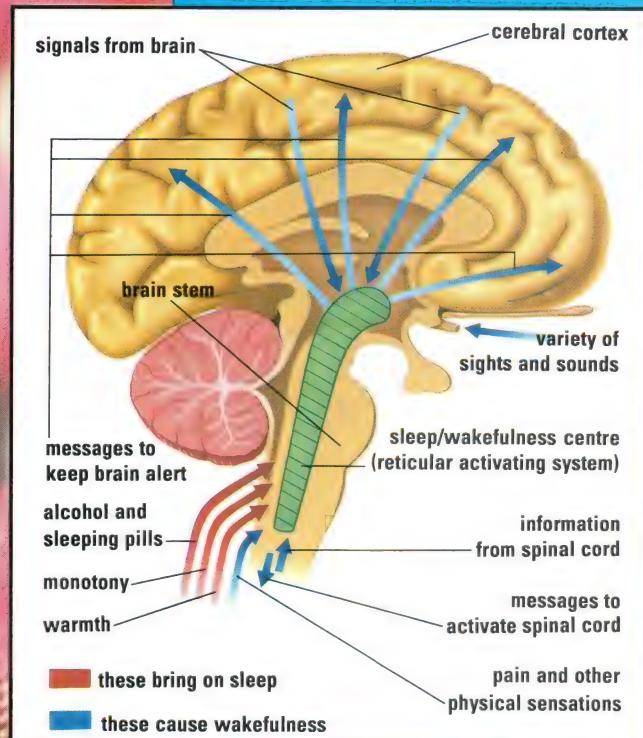
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QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- Anatomy of a nerve cell
- Disorders and diseases
- Investigating the paranormal
- The vital nervous systems
- How the mind works
- Disorientation methods
- The nature of intelligence



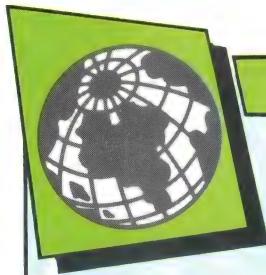
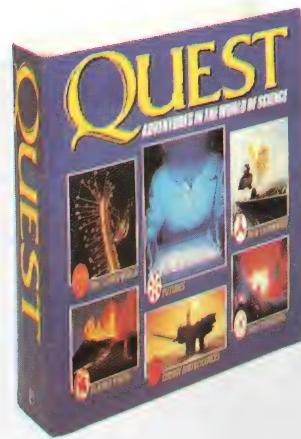
- Control centres in the brain

BRAIN POWER

14

QUEST

CONTENTS 14



PLANET EARTH

MIND OVER MATTER

The paranormal – controlled experiments – hypnotism – acupuncture – spiritual healing – dowsing

49–50

THE LIVING WORLD



THE DEVELOPING BRAIN

45–48

Early man – the embryonic brain – brain size – factors affecting development – importance of stimulation – early learning

WHIZZ KIDS

49–50

Different types of intelligence – creative thinking – lateral thinking – mental age – intelligence tests – child prodigies – I.Q.



NEW TECHNOLOGY

IMBALANCES

83–86

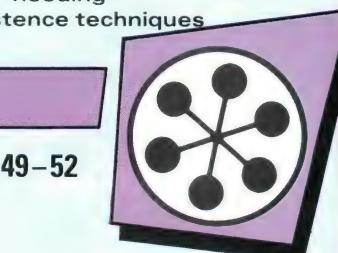
Brain chemistry – neurotransmitters – electrical impulses – the body's drugs – blood-brain barrier – diseases and disorders

BRAINWASHING

87–88

Sensory deprivation – white noise – disorientation rooms – hooding – chemical drugs – resistance techniques

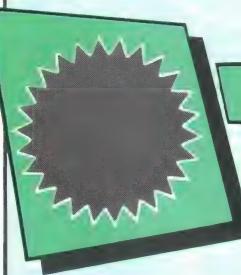
FUTURES



ELECTRONIC BRAINS

49–52

The latest computers – memory chips – microprocessors – robots – three-D graphics – modern music synthesizers and sequencers – speech recognition systems



ENERGY AND RESOURCES

MIND AND BODY

45–48

Structure of the brain – two nervous systems – function of nerve cells – transmitting electrical impulses – synapses – the vital spinal cord

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QUEST

ADVENTURES IN THE WORLD OF SCIENCE

■ Making banknotes from jeans

■ Extracting precious metals



Automated Teller Machine

■ The latest 'smart' card

■ Oil wealth

■ Plastic money

■ Computerized trading systems

■ Dealing round the clock

MONEY

15

QUEST

CONTENTS 15



PLANET EARTH

THE EARTH'S RICHES

51-54

What coins are made of – distribution of precious and base metals – mining – extracting copper by electrolysis

THE LIVING WORLD

TRADING ON THE FUTURE

51-52

'Hard' and 'soft' commodities – modern computerized trading systems – speculation – price monitoring



NEW TECHNOLOGY

HI-TEC SELLING

89-92

The International Stock Exchange – electronic dealing systems – up-to-date information services – the 'Big Bang'

SLOT MACHINES

93-94

Hi-tec machines – coin-operated units – detecting fake coins – light sensor scan for notes – ticket machines that give change

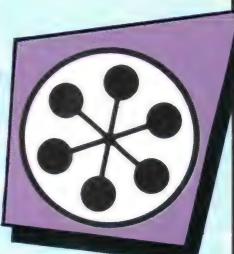


FUTURES

SMART MONEY

53-56

Paying with plastic – microcomputers in cards – automated cash dispensers – the latest 'smart card'



ENERGY AND RESOURCES

MINTING AND PRINTING

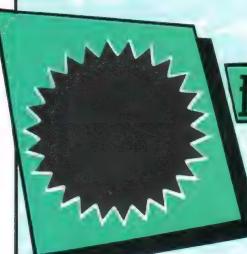
49-52

Foiling forgers – casting and cutting metal alloys – turning 'blanks' into finished coins – making banknote paper – printing processes – security threads

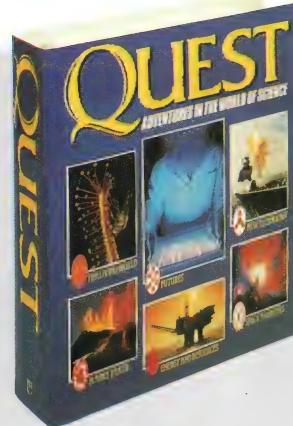
BLACK GOLD

53-54

Petroleum – fuels from oil – paying in petrodollars – oil production – developing new oil fields



Pack cover: the bright lights of Las Vegas – gambling capital of the USA (T. Wood/Stock photos); a wheel of assorted credit, charge and debit cards. **Fact file front cover:** International gold coins and bars (ZEFA); diagram of a cash dispenser. Back of pack: The photo of the hologram on the back of the pack is by Philippe Plailly/SPL.



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QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- Q Pictures from Space
- Q High-capacity optical discs
- Q Refraction and defraction
- Q Mirages and false perspectives
- Q Photographic reductions
- Q How animals see
- Q Bouncing light
- Q Laser surgery



LIGHT AND IMAGES 16

QUEST

CONTENTS 16

THE LIVING WORLD



VISION

Light-sensitive cells – the optic nerve – bipolar cells – many-faceted eyes – multi-focal lenses – 'seeing' heat

53–56

OPTICAL ILLUSIONS

How a mirage occurs – refraction of light – the illusion of movement – visual 'fatigue' – false perspectives – stereoscopes – 3-D films and pictures

57–58

NEW TECHNOLOGY



LASERS – HIGH ENERGY LIGHT

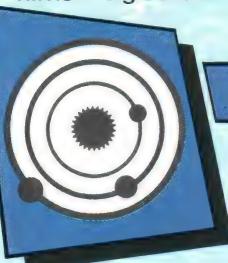
Electromagnetic radiation – how lasers work – different frequencies and colours – a high-precision surgical tool – vaporizing tumours – killer rays

95–98

MOVING PICTURES

Cine cameras – frame speed and size – projecting the image – revolving shutters – flicker rate – high-resolution films – big screen systems

99–102

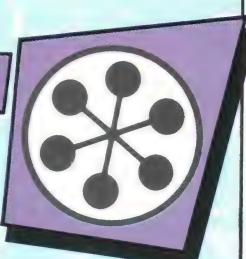


SPACE FRONTIERS

IMAGES FROM SPACE

New generation Space telescopes – mega mirrors – giant receivers – false colour images – ultraviolet radiation – microwave radiation

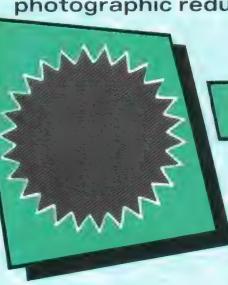
21–22



MICRO IMAGES

Digitized information – imprinting with lasers – cards with memory chips – optical discs for computers – putting libraries on disc – microfilm – photographic reduction

57–58

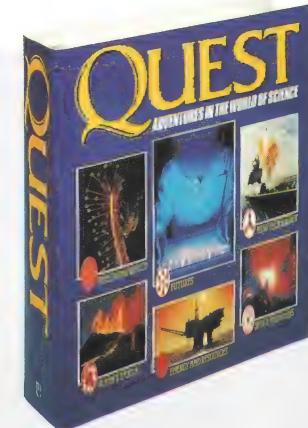


ENERGY AND RESOURCES

UNDERSTANDING LIGHT

The electromagnetic spectrum – converting light into energy – refraction and defraction – photons – speed of light – splitting light – photosynthesis

55–58



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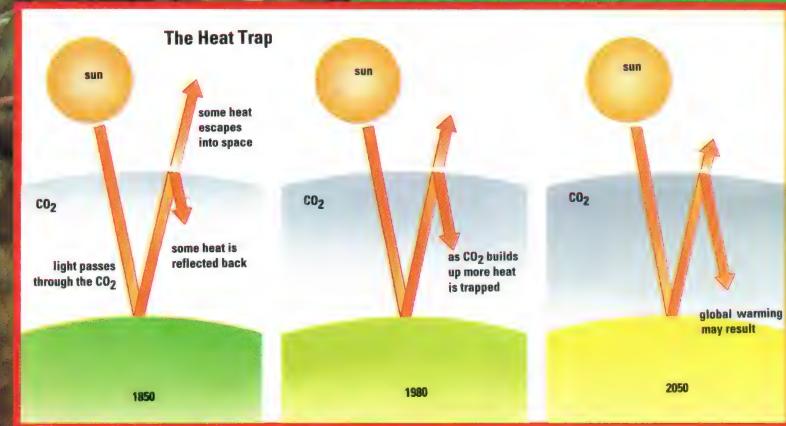
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QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- Q Life in the canopy
- Q How curare works
- Q Carnivorous plants
- Q Tribal rites
- Q Expeditions into the unknown
- Q The hazards of building dams and highways
- Q Yellow – the danger sign
- Q The consequences of deforestation



INTO THE JUNGLE 17

QUEST

CONTENTS 17



PLANET EARTH

INTO THE UNKNOWN 55-58

Expeditions – heat and humidity – dangerous insects – weird meals

THE GREENHOUSE EFFECT 59-60

Photosynthesis – respiration – build up of CO₂ – deforestation

THE LIVING WORLD

THE TROPICAL FOREST 59-60

Layers of vegetation – fighting for light – soil structure – adaptations



PLANT POWER 61-62

Carnivorous plants – flowers that stink – parasites – snares and traps

WILDLIFE 63-64

Danger signs – camouflage – fierce hunters – venomous snakes



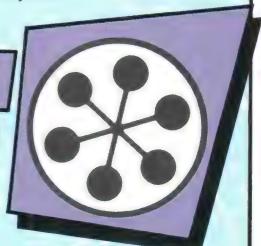
NEW TECHNOLOGY

FACTORIES OF THE FOREST 103-106

Logging techniques – tapping latex – building highways and dams – cooling concrete – aerial maps

LIVING LABORATORY 107-108

Plant tonics and painkillers – how curare works – cancer treatments – infusing plants – laboratory analysis – synthetic drugs



FUTURES

GENE BANK 59-60

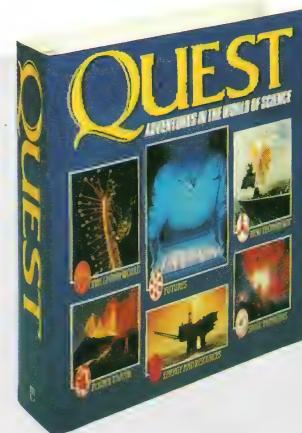
Creating new life forms – genetic variations – disease-resistant crops – the vital 'wildtype'



ENERGY AND RESOURCES

FARMING THE JUNGLE 59-60

Turning forest into pasture – slash and burn agriculture – indicator plants – changes in the soil



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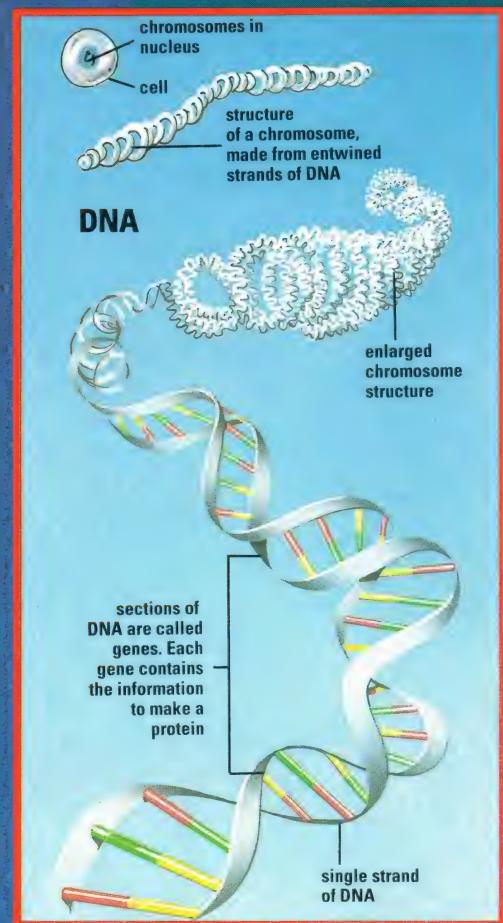
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QUEST

ADVENTURES IN THE WORLD OF SCIENCE



- What makes you unique
- Sending out sex signals
- A new star in space
- Atoms – the essence of everything on earth
- Continuation of the species

CREATIVE FORCES '18

QUEST

CONTENTS 18



PLANET EARTH

DNA - MOLECULE OF LIFE 61-62

Nature's computer discs — character dictating genes — the genetic code — mutations and diseases

BONDING 63-64

Anatomy of an atom — molecular chains — protons and neutrons — orbiting electrons — hydrogen atoms

THE LIVING WORLD

REPRODUCTION

65-68



SEXUAL CHEMISTRY

69-72

Sexy scents and signals — courtship behaviour — releasing sex hormones — fertilizing eggs



NEW TECHNOLOGY

BIOTECHNOLOGY

109-110

New plants from cuttings — growing plants in jelly — cloned plantations — creating disease-resistant plants

GENETIC ENGINEERING

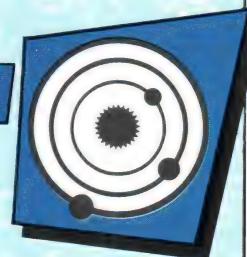
111-112

Extracting insulin — transferring genes — modifying bacteria — microinjections — Factor IX — transgenic sheep

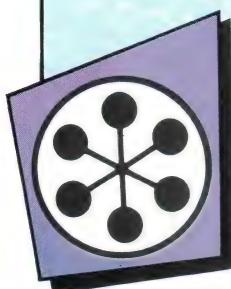
SPACE FRONTIERS

STAR BIRTH

23-24



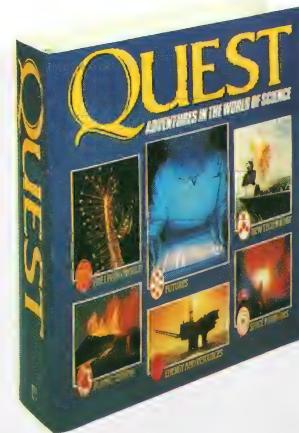
Nuclear transformation — the importance of cosmic dust — stellar shock waves — proto-stars — violent births — killer viruses from outer space



FUTURES

HI-TECH SEX 61-64

Artificial insemination — freezing sperms — fertility drugs — test-tube babies — selective breeding — embryo implantation



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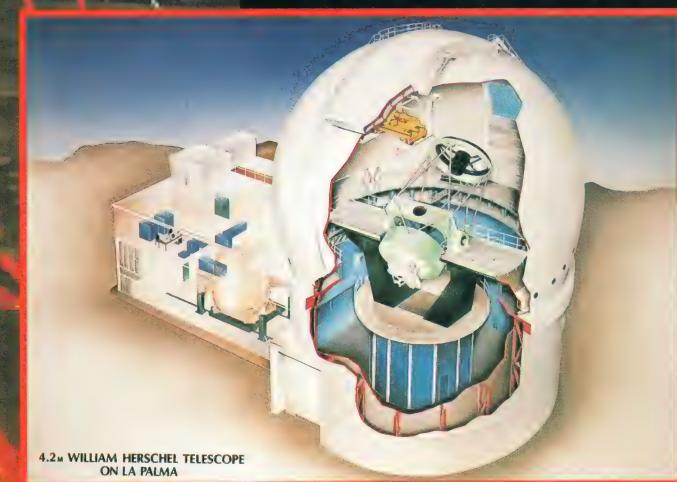
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QUEST

ADVENTURES IN THE WORLD OF SCIENCE



- Q Telling the age of planet Earth
- Q The meaning of death
- Q The birth and death of the Universe
- Q Clocks that measure microseconds
- Q How animals' tell the time
- Q Freezing a moment for ever
- Q Time travel – is it possible?



4.2m WILLIAM HERSCHEL TELESCOPE
ON LA PALMA

TIME

19

QUEST

CONTENTS 19



PLANET EARTH

ROCKS OF AGES

65-68

Rock strata – upheavals in the Earth's crust – irregular layers – fossils – modern methods of dating – clues from pottery

THE LIVING WORLD

BIOLOGICAL CLOCKS

73-76



AGEING

77-80

Life expectancy – comparative lifespans – the oldest living plant – theories of ageing – effects of growing old – death of brain cells



NEW TECHNOLOGY

SPLITTING SECONDS

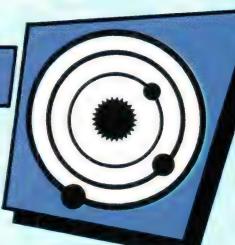
113-114

The first clock – the Earth's rotation – variable days – measuring time – pendulums – quartz crystals – super-accurate atomic clocks

CAUGHT IN ACTION

115-116

Capturing action on film – shutter speeds – revolving-prism camera – one million frames per second – time-lapse photography

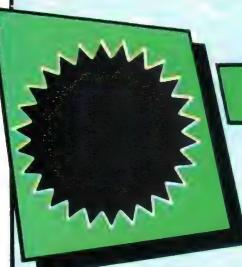


SPACE FRONTIERS

WHEN TIME BEGAN

25-28

Zero time – creation – the Big Bang – atoms form – expansion and contraction of the Universe – birth of the first stars – black holes

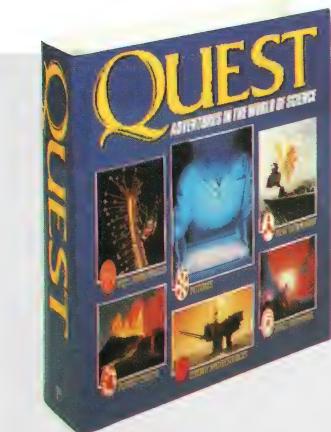


FUTURES

TIME TRAVEL

65-66

Travelling into the future – the speed of light – when time slows down – time 'dilation' – changes in length and mass



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QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- Q The force to move mountains
- Q When dirty water spells danger
- Q Fighting pain with water
- Q How a hydroelectric power plant works
- Q The salt of the Earth
- Q Safeguarding the water we drink

Artic Icebreaker



WATER OF LIFE 20

QUEST

CONTENTS 20

PLANET EARTH



FANTASTIC FLUID

69-72

Atomic reactors – contraction and expansion – freezing and boiling points – glaciers and icebergs – sound underwater – SONAR

TAKING THE PLUNGE

73-76

Hot and cold packs – the Jacuzzi – why swimming is good for you – 'wet and wild' rides – a surge of adrenalin – bellyflopping with confidence

THE LIVING WORLD



MICROSCOPIC LIFE

81-82

Contaminated water – effects of cholera and typhoid – how bacteria multiply – cause of legionnaire's disease – plankton – ways of sterilizing water



NEW TECHNOLOGY

WATERWORKS

117-118

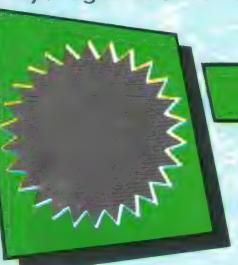
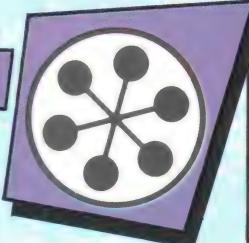
River pollution – legal controls – reservoirs full of fish – chlorine in tap water – solid waste – the sewage works – some uses for sludge

FUTURES

WATER POWER

67-70

Hydroelectric plants – the world's tallest dam – reaction and impulse turbines – the force of the waves – hydrogen-fuelled rockets – quicksand



ENERGY AND RESOURCES

EXPLOITING SALT WATER

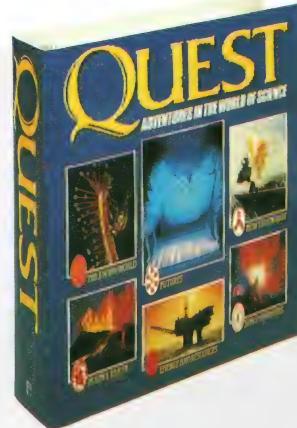
61-62

The sea's salt balance – salt lakes and dead seas – flash distillation – salt water crops – salt depletion

THE WATER CYCLE

63-66

Rain, hail and snow – transpiration and evaporation – aquifers – dangers of flooding – too much salt



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QUEST

ADVENTURES IN THE WORLD OF SCIENCE

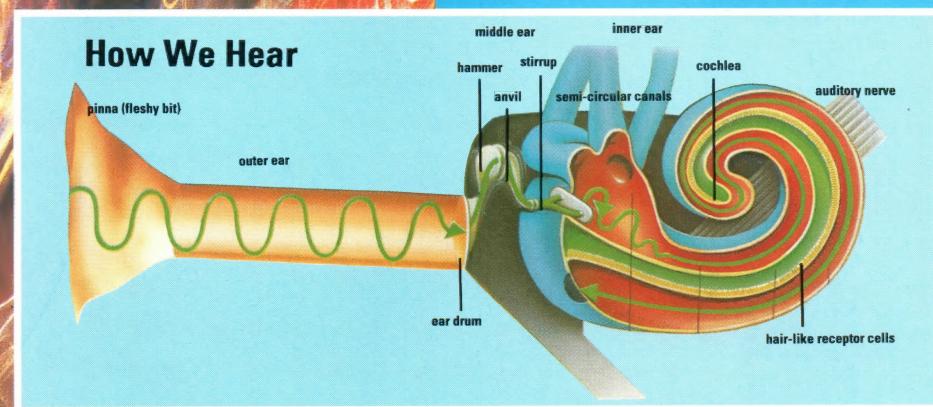
Q Breaking the sound barrier

Q Pure notes

Q Journey of a soundwave

Q What makes up sound?

Q Stretching sound



Q How pop videos are made

Q Our own auditory system

SCIENCE OF SOUND 21

QUEST

CONTENTS 21



PLANET EARTH

MAKING MUSIC

77-80

Recognising music — pure tone — different instruments — sine waves — harmonies — resonance — pitch and timbre — shape and materials

THE LIVING WORLD



TUNING IN — HOW WE HEAR

85-88

Compression waves — analysing sound and music — inside the ear — three zones of the ear — interpreting nerve signals — how insects hear — ultrasonic sound — night 'vision' — reflected sound



NEW TECHNOLOGY

MAKING TRACKS

119-122

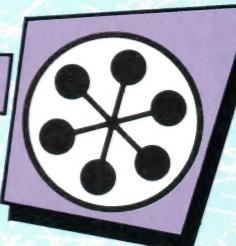
The recording studio — pilot tracks — synchronising tracks — overdubbing — the mixing desk — adding reverb — digital delays — echoes — chorusing

POP VIDEOS

123-124

Special effects — combining images on one frame — digital effects — background colour — vision mixing — stretching and shrinking shapes

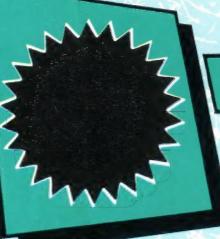
FUTURES



SYNTHETIC SOUND

71-74

Synthesizers — samplers — sequencers — individual composition — MIDI linking system — layers of sound — volume control

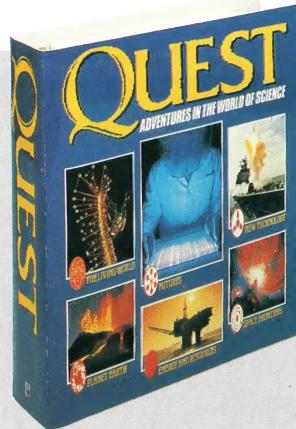


ENERGY AND RESOURCES

SOUND VIBRATIONS

67-68

Sound energy — regular vibrations — sine waves: pure sound — pitch and volume — breaking the sound barrier — ultrasound — shattering glass



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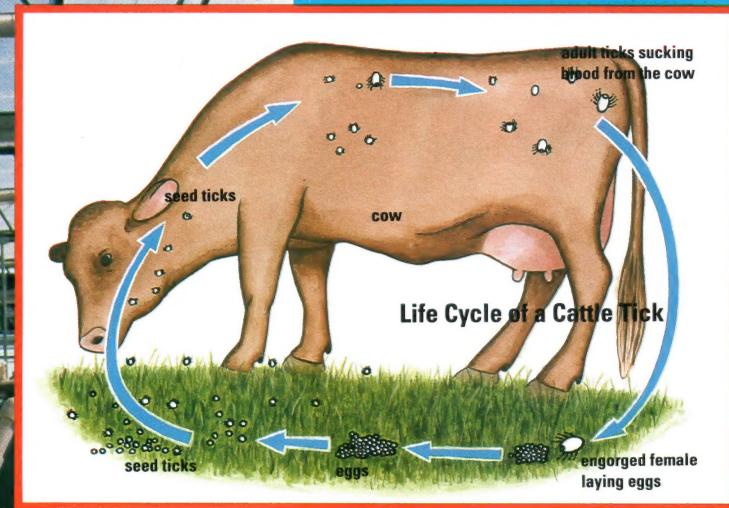
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QUEST

ADVENTURES IN THE WORLD OF SCIENCE



- Q The food chain
- Q Forcing crop and animal growth
- Q Growing plants without soil
- Q The real price of pesticides
- Q Unusual fish from the seas
- Q Prototype Space-farm
- Q Irrigating the desert

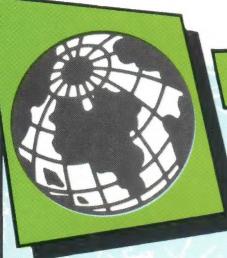
FARMING

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PLANET EARTH



FOOD AID

Shortages and surpluses – unequal distribution – the 'Green Revolution' – growing crops for cash – new solutions to old problems

81-82

GREENING THE DESERT

Irrigation – centre pivot systems – giant revolutions – low pressure methods – harvesting water – fuel and fodder projects

83-84

THE LIVING WORLD



PEST CONTROL

Machines that destroy pests – chemicals that kill them – spraying crops – inoculating animals – side effects of pesticides – polluting the food chain

89-92

NEW TECHNOLOGY



FACTORY FARMING

Computerised feeding systems – mass chicken coops – 'forcing' animal growth – breeding leaner pigs – 'bringing on' crops – earlier harvests

125-128

INDOOR FIELDS

Growing plants without soil – huge hydroponic installations – macronutrients – monitoring nutrient levels – higher yields – artificial sunshine

129-130

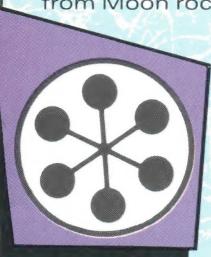
SPACE FRONTIERS



ASTRO AGRICULTURE

Prototype Space-farms – the endless days implications of lack of gravity – water from Moon rocks – Biosphere II

29-30



FUTURES

FUTURE FARMING

Automation – test-tube crops – tissue culture – growing cotton in the laboratory – the super soy bean

75-76

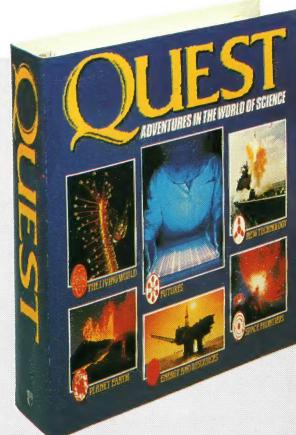
ENERGY AND RESOURCES



AQUACULTURE

Farming the seas – overfishing – creatures from the deep – salmon and oyster farms

69-72



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